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Patent

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A METHOD OF SEALING A MANHOLE RISER
AND A CATCH BASIN AND APPARATUS FOR SAME

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RELATED APPLICATION

~~This application is a continuation-in-part of serial~~
~~number 08/273,503, filed on July 11, 1994.~~

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FIELD OF THE INVENTION

The present invention relates to a method of sealing a manhole riser and a catch basin, as well as sealing storm sewer pipes. More particularly, it relates to an improved, economical method to seal a manhole riser and catch basin from unwanted water and other contaminants which leak therethrough.

BACKGROUND OF THE INVENTION

Manhole risers, manhole chimneys, all generically describe the top of the unit which extends from sewer pipes to the ground surface. In particular, the top portion of the manhole riser comprises numerous cement adjusting rings, which sit atop each other and typically have specific dimensions. Each ring may be added to increase the height that the manhole riser extends to. As a road is repaved and new layers of pavement are added, it often times is necessary to add an additional ring such that the manhole covers stay flush with the road.

Catch basins are situated below storm sewer drainage grates found on roads. The storm sewer grates are

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collection sites for water drainage from streets which flow through catch basins. Catch basins generally comprise a series of rectangular cement rails or collars. The cement collars are stacked in a manner to create a rectangular "basin" through which water passes. Each collar of the basin generally comprises two three-sided cement rails which, when fitted together, create a rectangle. The catch basins extend up to the grate, through which drainage water passes.

10 A problem that has existed with manhole risers and catch basins in the past is surface water passes through gaps and spaces in the cement rings and cement collars. Further, the water will often times freeze between and within the cement structures, and the freeze/thaw cycle will deteriorate and break up the cement structures, requiring them to be replaced.

Installation, repair or replacement of sanitary/storm manhole risers, storm catch basins, and storm sewer pipes is a continuous process in maintaining the infrastructure of municipalities. In this process, a special skill called "adjustment" or "adjusting" occurs. Adjustment/adjusting is a process whereby the manhole riser or storm catch basin is adjusted to the height of the road surface.

As water utilities are installed, a manhole for access to the infrastructure system is constructed according to engineering plans on a straight line. If the road has a curve, it requires more manholes than a straight road. The bottom section of the manhole utility access is called a barrel, and between the barrel and riser is the "cone". The cone is made of pre-cast concrete and will not leak because it is one piece. After the cone is placed in position, the adjustment process begins at the top of the cone in order to cause the manhole riser necking to meet flush with the road surface.

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By using concrete adjusting rings and mixed Portland cement on top of the cone, rings are stacked to bring the manhole and top casting to the road elevation. The procedure is similar for storm catch basins.

5 Poor workmanship, poor cement, improper grouting, and the freeze/thaw cycle will cause hairline cracks in the adjustment necking. If a crack develops in the asphalt, water seeks its lowest level and begins to work against the cracks. Soon thereafter, the cracks enlarge and water,
10 dirt and other debris begin to seep into the infrastructure.

A further problem occurs at the road surface around manhole risers and catch basins. When leaks develop, the soil erodes, and the erosion causes the ground to sink.
15 This ground sinking action then causes the catch basin or manholes to protrude, and the road needs to be repaired. This loss of supporting material causes the road to collapse around the resultant voids.

Previously, contractors practicing the adjusting
20 process for utilities and municipalities have not had an economical solution for the above problems. One solution, a "filter blanket", has been used in the past. The filter blanket is a geo-textile fabric material that is placed on new roads that have poor underlying soils. The filter
25 blanket gives strength to the road surface. Often times, a contractor will simply cut off a piece of the filter blanket and wrap around the manhole neck to help prevent sand and dirt from passing into the manhole. However, the filter blanket is not adequate for the prevention of water
30 to pass into the adjustment rings.

These problems are described in U.S Patent Nos. 4,475,845 and 4,469,467. These patents describe the problems of water infiltration into manhole chimney seals, and attempt to provide a solution. However, the problem
35 with the solutions proposed in the '845 and '467 patents

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has not been satisfactory to date, due to the high cost of the product. The '845 patent discloses a chimney seal having numerous sealing sections and a securing means for the chimney seal. In particular, the sealing means
5 describes a retaining band to be used with different preformed skirts. The '467 patent discloses a similar apparatus. The products allegedly covered by these patents are very expensive, and not feasible for widespread use as manhole riser sealer systems. Due to the numerous numbers
10 of manholes which exist and the increasingly tight budgets of municipalities, there exists a need for an inexpensive apparatus and method of sealing, which does not employ the use of "preformed" rings.

U.S. Patent Nos. 4,540,310, 4,737,220 and Canadian
15 Patent No. 1,142,009 all claim to have some type of sealing means which could be used for sealing water from manhole risers. However, none of these patents address the problems associated with a need for a low cost product and a method for sealing. The present invention addresses such
20 a need, and is disclosed herein. Further, the above patents and existing solutions are directed to manhole risers, and do not address the needs addressed in the catch basin market.

It is the object of this invention to create a barrier
25 which may be placed over adjustment necks of manhole risers and catch basins in a manner of minutes with a one person operation.

It is the object of this invention to have an economical, cost effective method, in dealing with water
30 leaks and deterioration of adjustment necks and catch basins. The present invention eliminates contaminated water, sand, dirt and other debris from penetrating into water system infrastructures, and thereby eliminates or reduces the amount of water treatment needed at the city
35 water treatment plant.

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It is the object of this invention to provide an economical method of sealing the intersection between two adjoining pipes.

The present invention also reduces the amount of
5 ground erosion associated with cracks and leakage caused by cracks in manhole risers and catch basins.

SUMMARY OF THE INVENTION

The present invention describes and claims an improved
10 method for sealing a manhole riser or catch basin. The invention also describes and claims an improved kit for sealing manhole risers and catch basins. The method of sealing a manhole riser, with adjusting rings, is described as follows:

- 15 a. selecting a first and second band of elastomeric material, said first and second band having a total height of at least the height of the manhole riser from the base of the bottom adjusting ring of the manhole riser to the top edge of the top adjusting ring of the manhole riser;
- 20 b. placing the first band over the manhole adjustment area and positioning the bottom edge below the adjustment on the cone; and
- c. placing the second band over the manhole riser, positioning the second band such that it extends over the
25 top edge of the first band and also extends over the top edge of the top adjusting ring.

The present invention also discloses a kit for sealing manhole risers. The kit comprises:

- a first and second band of elastomeric material, the
30 first and second band having a total height of at least the height of the manhole riser from one inch below the base of the bottom adjusting manhole riser to the top edge of the top adjusting ring of the manhole riser.

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The present invention also addresses sealing catch basins. The method for sealing catch basins comprises the following steps:

a. selecting a first and second band of elastomeric material, the first and second band having a total height of at least the height of the catch basin from the base of the bottom adjusting catch basin ring to the top edge of the top adjusting ring of the catch basin;

b. placing the first band over the catch basin and positioning a bottom edge of the band at the base of the catch basin, a top edge of the first band extending toward the top of the top adjusting collar; and

c. if necessary, placing the second band over the catch basin, positioning the second band such that it extends over the top edge of the first band and also extends over the top adjusting ring and into the edge of the catch basin casting.

The present invention also describes a kit for sealing catch basins. The kit comprises:

a first and second band of elastomeric material, the first and second band having a total height of at least the height from one inch below the bottom of the catch basin from the base of the bottom adjusting catch basin ring to the top edge of the top adjusting ring of the catch basin.

In another embodiment, a method to seal pipe intersections and barrel intersections which are sealed together underground to support a cone, comprise a tape having two strips of adhesive applied to one side of the tape. The tape is dispensed, a release liner is peeled off of the adhesive, and the tape is tightly wrapped around the riser, cone or other conduit which needs to be sealed. The ends are overlapped and sealed with a block of mastic.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a perspective view of the present invention sealing a manhole riser.

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Figure 2 shows a perspective view of the present invention sealing a catch basin.

Figure 3 shows individual components of the kit for sealing a manhole riser.

5 Figure 4 shows one of the individual components of the kit of Figure 3.

Figure 5 shows the kit in boxed form.

Figure 6 shows components of the present invention used in a method to seal pipe junctures.

10 Figure 7 shows components of the present invention used to seal barrels supporting a cone.

DETAILED DESCRIPTION OF THE INVENTION

The present invention, although describing manhole risers and catch basins, also is directed to large standard
15 city sewer manholes which are commonly called cones or barrels. Power and phone companies also have underground cones, which are similar to manhole risers. The present invention envisions the method of sealing a manhole riser,
20 a catch basin, a pipe juncture or any large structure with rings or collars secured together. The present invention may also seal the area between the cone and the barrel which often leaks.

As can be seen in Figure 1, the present invention is a
25 three-piece sealing system shown generally as 10. The manhole riser is shown as 10, with a break-away as 14. Risers can vary from 4 inches to 16 inches in height depending on the soil and surface conditions. The break-away shows the manhole riser with a portion of the sealing
30 system removed for illustration purposes. The individual adjusting rings 16, 18, 20, 22 and 24 are stacked atop one another. The adjusting rings are generally cemented to one another, with the mortar or Portland cement visible as 26.

For the purposes of the present application, "manhole
35 riser" refers to what is shown in Figure 1, which comprises

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a plurality of adjusting rings which lead up to the top casting, which is shown as 12. The casting 12 is an annular collar, which supports the manhole cover (not shown). It is intended that the manhole cover be flush or
5 a bit below the road surface. Beneath the riser 10, is a one-piece cone (not shown). The one-piece cone is typically made of concrete, and need not be shown for the present invention. As discussed above, leaks occur through the adjusting rings, particularly between the adjusting
10 rings, and the present invention discusses a solution to these leaks.

Figure 2 discloses a catch basin generally shown as 50. The catch basin has individual adjusting collars, which are shown at the break-away portion of the sealing
15 system 52 as 54, 56, 58, 60 and 62. A top casting is shown as 63. The collars are secured in place with Portland cement or mortar, shown generally as 64. Generally, two collars are fitted together with a point of intersection shown as 66. It is intended that the casting 63 with a
20 grate on top (not shown) be marginally below the road surface, with the road surface tilted in a manner such that storm water drains into the catch basin 50. Water passes through a grate which appears on top of the casting 63, through the middle of the collars, into the storm sewer
25 system. The storm sewer system typically discharges into areas used as irrigation, lakes, rivers, etc. This is different from manhole risers, which typically are involved in the treatment of water which is thereafter piped to homes and businesses for consumption. Although the manhole
30 riser and catch basin perform different functions, as described above, the same problems apply to both. The mortar or cement holding the rings or collars in place often breaks down with the freeze/thaw cycle or with age. Furthermore, cracks may develop in the rings or adjusting

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collars, whereby water, sand, and other contaminants may freely pass through the cracks.

The present invention addresses these concerns. Referring back to Figure 1, there is a three-piece sealing system, with a bottom band being 30, a middle band being 32 and a top band being 34. The bands are large, continuous bands of an elastomeric material, with the ends secured together to form a continuous loop. Preferably, the ends are secured together by a vulcanizing process. The first band 30, is a circular shaped elastomeric band which is adapted to fit the bottom of manhole riser 10. The second band, shown as 32, is placed in the mid region of the manhole riser 10. Preferably, the band is an EPDM elastomeric material (ethylene propylene diene) or Neoprene. EPDM and Neoprene materials are abrasion resistant, rubber like synthetic polymers. Other types of possible elastomeric materials include nitrile, Hypalon, and CPE (chlorinated polyethylene) rubbers.

Preferably some bands of the present invention have a mastic adhesive on at least a portion the interior of the band. Preferably, a release liner covers the exterior of the adhesive. Once the bands are in place, the release liner is removed. The adhesive thereafter secures the band to the riser. Figures 3 and 4 disclose the use of an adhesive on the bands. Figure 3 shows the preferable adhesive positioning. Another preferred adhesive position is to have an adhesive on the top and bottom of the interior of the bands with no adhesive in the middle portion of the band. The top band 34 has adhesive on about the top half of the band. Band 32, preferably, has no need for adhesive as it is secured by the overlapping of bands 34 and 30, preferably, bottom flange portion 36 has adhesive thereon.

The first band 30 is drawn over the adjustment neck to the bottom of riser 10. If a slab is involved, the band

will automatically flair out and adhere to the slab catch basin. This "flair" is especially preferred if the cone is sitting on a cement slab. The "flair" flares out to meet the cement slab. Preferably, the bottom band extends
5 partially below the base of the bottom adjusting ring (about one inch).

In the preferred embodiment, the top band 34 terminates at the top of the top adjusting ring 24 on the bottom edge of the casting 12. Preferably, band 34 has an
10 approximate height of 6 inches and is of an elastomeric material that stretches over the top edge of the top adjusting ring 24 to the bottom edge of the casting 28 to create a tight seal. The entire structure is now water tight.

15 Thus, to summarize the method, prior to installing the invention, remove all dirt from around the base of the riser or basin. Clean the riser or basin so it will receive the adhesive. Smooth all sharp corners with an abrasive stone. Wipe clean with a rag. A first ring of
20 material 30 is pulled over the manhole riser 10, and pulled down to the bottom. The top of the first band must reach the top of the top adjusting ring. If the bottom band does not reach the top adjusting ring, ^{and therefore} an extension band must be used. Preferably, adhesive is previously applied to
25 the inside, and a release liner is pulled off the band 30. A second band 32 is pulled over riser 10 and positioned to overlap riser 10 by approximately 2 inches. After the second band 32 is in place, the third, smaller top band 34 is put in place after adhesive is applied or exposed from
30 the inside of band 34. This extends below the top portion of the second band 32, and extends over the top portion of the top adjusting ring, and extends onto the casting 28. Preferably, this third band is approximately a 6 inch band. However, the present method and kit may work if the top
35 band reaches from a mid point region measured from the base

of the riser to the top edge of top adjusting ring. Thus, the actual size of the bands is not important, with the criteria that the bands cover the whole exterior of the manhole riser.

5 Optionally, the middle third band may or may not be needed, depending on the number of adjusting rings used. Regardless of whether there are two bands or three bands, the system is sealed in place with adhesive, mortar and the manhole riser is thereafter buried.

10 Catch basin 50, shown in Figure 2, utilizes a band system whereby the bands are rectangular in shape. The first band 68 is placed over the catch basin such that it is pulled to the base of the catch basin 50. The bottom band 68 is cut about 1/2 inch on 3 inches either side of
15 the corner to relieve tension. Flange 74 thereafter contacts the slab, allowing water to run-off. Top band 22 is thereafter placed on top of the catch basin 50. The bottom edge of the top band 72 is positioned below the top edge of the second rectangular band 70. The top edge of
20 the third band 72 thereafter extends beyond the top edge of the top adjusting collar 62, and extends on to the bottom edge of the casting 63. Thereafter, catch basin is sealed and buried.

 The circular bands used for the manhole riser and the
25 rectangular bands used for the catch basin of the present invention are elastomeric material, which is generally cut from a pattern and is made into a band from a rectangular cut piece of material with the use of a vulcanizing process to secure the band. The same procedure is performed with
30 the rectangular band.

 Figure 3 shows a preferred "kit" of bands for the catch basin and the manhole riser of the present invention. As is evident, the top band has an adhesive portion 35 at the top. This is so the top band is secure to the top
35 collar and/or casting of the catch basin. The kit includes

an extension band 32 and the bottom band 30, which has an adhesive portion 31 on the bottom portion.

Figure 4 shows a perspective view of the inside of band 34 of the present invention.

5 Figure 5 shows a complete kit of the present invention, with bands 30, 32 and 34.

In the preferred embodiment, the bottom band is 12 inches high and has is capable of being flaired if a slab is involved. All of the bands have a thickness of about
10 0.06 inches and have a 60 durometer. Adhesive is applied to the interior surface. The top band lays on the casting to seal against infiltration. The vertical part of the top band fits over the top portion of the bottom or middle band and should overlap at least 2 inches. An extension band
15 with a height of approximately 8 inches may be used to gain additional height as described above. The extension piece fits over the bottom piece and should preferably overlap by at least 2 inches. The top piece will thereafter fit over the extension band, which overlaps by at least about 2
20 inches over the extension band.

Preferably the extension band should have an adhesive or strip of mastic on the bottom edge, where the bottom of the extension band contacts the top of the bottom band. Thus, the extension band would have adhesive on the bottom,
25 inner surface which contacts the top, outside surface of the bottom band. This ensures the integrity of the seal. Likewise, the top band should have adhesive or mastic which is on the interior surface, and contacts the top, outer surface of the extension band. Again, this ensures the
30 integrity of the seal. The sealant used as an adhesive for the bands is a flexible butyl mastic sealant.

The present invention also provides an economical method of sealing the area around a pipe juncture. As shown in Figure 6, pipes 80 and 82, which may be cement
35 pipes, are often connected together with a "male" 82 and

"female" 80 pipe. The male pipe 82 is inserted into an enlarged, female end of another pipe 80. The tape or connector has adhesive sections 86, and 88 and has two ends 90, and 92.

5 However, often times the juncture 94 or intersection formed by these pipes is not water tight or impervious to infiltration. The present invention addresses these problems with the use of a tape system.

10 As is shown in Figure 6, a pull away of the tape 92 is illustrated. The method of sealing the pipe juncture utilizes a roll of elastomeric tape. The tape 92 preferably comes in a dispenser (not shown), with the tape being 50 feet long, rolled in the dispenser box, and the tape 92 is made of EPDM and is 8 inches wide and 0.60
15 inches thick. The tape 92 has mastic on the top and bottom of the tape 92 running lengthwise. The mastic preferably is 1.5 inches x 0.25 inches thick. Preferably it is the same mastic as described above.

20 The method involved having two pipes which are configured as shown in Figure 6 is described below. A section of elastomeric tape is cut, with the stretched length of the tape being greater than the circumference of the pipe juncture that the tape is covering.

25 The tape has previously applied to it at least two strips of adhesive extending lengthwise along the tape. The tape is positioned such that about one-half of the width of the tape is on one side of the pipe juncture and the remaining half of the tape is on the other side of the pipe juncture. The tape is pulled tightly, and wrapped
30 around the juncture, such that there is a portion of a first end of the tape extending over the second end of the tape.

35 Either prior to, or after the tape has been pulled tightly around the pipe juncture, a connector 96 is attached to one end of the tape. The connector 96 is

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preferably a square of mastic, with a release liner. As shown in Figure 6, the connector 96 acts as a splice for the two ends 90 and 92 of tape 84. The mastic may be double sided or single sided and may be attached in numerous ways. It can be attached to tape 84 prior to wrapping around the pipe juncture 94, or it can be placed on the pipe juncture after the tape 84 is wrapped around the pipe juncture 96.

In addition to pipe junctions, the tape system may be applied to barrels which support the cone. In this other embodiment, a method to seal the joint where a manhole barrel and cone are joined. This is comprised of a band of predetermined size elastomeric material. The band has two strips of mastic on the outside edges of one side. The band is pulled into place over the joint, the release paper on the mastic is removed and pressed into panels.

Although the present invention has been described with reference to preferred embodiments, workers skilled in the will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

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